Claims

[1] A quantum dot light-emitting diode comprising a pair of top and bottom electrodes and a quantum dot light-emitting layer provided between the electrodes wherein an inorganic electron transport layer is formed between the quantum dot light-emitting layer and the top electrode.

[2] The quantum dot light-emitting diode according to claim 1, wherein the diode comprises an anode, a hole transport layer, a quantum dot light-emitting layer, an inorganic electron transport layer and a cathode formed in this order on a substrate.

[3] The quantum dot light-emitting diode according to claim 1 or 2, wherein the inorganic electron transport layer is made of an oxide selected from the group consisting of TiO_2, ZnO, SiO_2, SnO_2, WO_3, Ta_2O_3, $BaTiO_3$, $BaZrO_3$, ZrO_2, HfO_2, Al_2O_3, Y_2O_3 and $ZrSiO_4$; the nitride Si_3N_4; or a semiconductor compound selected from the group consisting of CdS, ZnSe and ZnS.

[4] The quantum dot light-emitting diode according to claim 1 or 2, wherein the quantum dot light-emitting layer is made of a material selected from the group consisting of: Group II-VI compound semiconductor nanocrystals, including CdS, CdSe, CdTe, ZnS, ZnSe, ZnTe, HgS, HgSe and HgTe; Group III-V compound semiconductor nanocrystals, including GaN, GaP, GaAs, InP and InAs; PbS; PbSe; PbTe; CdSe/ZnS; CdS/ZnSe; and InP/ZnS.

[5] The quantum dot light-emitting diode according to claim 1 or 2, wherein the inorganic electron transport layer is formed by a solution coating process selected from the group consisting of sol-gel coating, spin coating, printing, casting and spraying, or a vapor coating process selected from the group consisting of chemical vapor deposition (CVD), sputtering, e-beam evaporation and vacuum deposition.

[6] The quantum dot light-emitting diode according to claim 2, wherein the hole transport layer is made of a material selected from the group consisting of poly(3,4-ethylenedioxythiophene) (PEDOT)/polystyrene para-sulfonate (PSS) derivatives, poly-N-vinylcarbazole derivatives, polyphenylenevinylene derivatives, polyparaphenylene derivatives, polymethacrylate derivatives, poly(9,9-octylfluorene) derivatives, poly(spiro-fluorene) derivatives, N,N'-diphenyl-N,N'-bis(3-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine (TPD), N,N'-di(naphthalene-1-yl)-N,N'diphenyl-benzidine (NPB), tris(3-methylphenylphenylamino)-triphenylamine (m-MTDATA), and poly(9,9'-dioctylfluorene-co-N-(4-butylphenyl)diphenylamine (TFB).